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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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## FULL CONTENTS

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**[Claim(s)]**

[Claim 1] HC sorbent which comes on a carrier from the powdered inorganic crystal nature molecular sieve which adsorbs hydrocarbon in exhaust gas is supported. The 1st catalyst bed which uses Pd as catalyst metal is formed in each surface of the above-mentioned HC adsorbent particle. The catalyst for exhaust gas depuration of the internal combustion engine characterized by forming the rare-earths oxide layer which uses a rare-earths oxide as the main ingredients on the 1st catalyst bed of the above, and forming the 2nd catalyst bed which uses either [ at least ] Pt or the Rh(s) as catalyst metal on the above-mentioned rare-earths oxide layer.

[Claim 2] In the catalyst for exhaust gas depuration of the internal combustion engine indicated to Claim 1, the above-mentioned rare-earths oxide is CeO<sub>2</sub>. Catalyst for exhaust gas depuration of the internal combustion engine which comes out and is characterized by a certain thing.

[Claim 3] In the catalyst for exhaust gas depuration of the internal combustion engine indicated to Claim 3, the above-mentioned carrier is a MONORISU carrier, and it is the above-mentioned CeO<sub>2</sub> per these 1l. of carriers. Catalyst for exhaust gas depuration of the internal combustion engine characterized by quantity being 15-100g.

[Claim 4] The catalyst for exhaust gas depuration of the internal combustion engine characterized by the above-mentioned HC sorbent being crystalline aluminosilicate in the catalyst for exhaust gas depuration of the internal combustion engine indicated to Claim 1.

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**[Detailed Description of the Invention]****[0001]**

[Industrial Application] This invention relates to the catalyst for exhaust gas depuration of an

internal combustion engine.

[0002]

[Description of the Prior Art] As a catalyst which purifies HC (hydrocarbon), CO (carbon monoxide), and NOx (nitrogen oxides) in the exhaust gas of an internal combustion engine What prepares the 1st catalyst bed which uses a zeolite as the main ingredients on a MONORISU carrier, and prepares the 2nd catalyst bed which uses as the main ingredients \*\*\*\*\* equipped with oxidation reduction ability on this 1st catalyst bed is known (refer to JP,H2-56247,A). To the 1st catalyst bed of the above, if needed The precious metals, such as Pt, Pd, and Rh, and CeO<sub>2</sub> (ceria), The rare-earths oxide of La<sub>2</sub> O<sub>3</sub> (Lantana) etc. is supported, the precious metals, such as Pt, Pd, and Rh, are supported by the alumina coat layer, and, as for the 2nd catalyst bed of the above, the above-mentioned rare-earths oxide, a zirconium dioxide, etc. are supported if needed.

[0003] The above-mentioned catalyst for exhaust gas depuration in the time between [ of an internal combustion engine ] the colds when [ and ] HC in exhaust gas is adsorbed by the zeolite of the 1st catalyst bed of the above when it is in the status that an air-fuel ratio is rich, and exhaust gas temperature and the degree of catalyst temperature rise by warming up The 2nd catalyst bed of the above performs oxidization of HC and CO in HC desorbed from the 1st catalyst bed of the above, and exhaust gas, and reduction of NOx.

[0004]

[Problem to be solved by the invention] Although Pt and Pd have [ this invention person ] high oxidization ability about the function as a catalyst metal of Above Pt, Pd, and Rh, compared with it, oxidization ability of Rh is low, Therefore, the knowledge that decomposition of NOx progressed comparatively efficiently with oxidization of HC when Pt's and Pd's being effective in depuration of HC, and Pt and Rh are combined had been acquired.

[0005] However, in the above-mentioned conventional technology, when three persons of Above Pt, Pd, and Rh are used together as the catalyst metal of the 1st catalyst bed of the above, or a catalyst metal of the 2nd catalyst bed, there is a problem that both HC purifying rate and a NOx purifying rate fall compared with the case where Pt and Rh are used together. This is considered for interfering each other so that Pt, Rh, and Pd may check a mutual catalyst function. On the other hand, although it is possible to separate Pd from Pt or Rh by supporting Pd to the 1st catalyst bed and for example making the 2nd catalyst bed support Pt and Rh, respectively, Pd, Pt, and Rh contact in the interface of the 1st catalyst bed and the 2nd catalyst bed, and a good result is not necessarily obtained.

[0006] Then, it tends to raise a NOx purifying rate while this invention combines Above Pd with Above Pt or Rh so that the original catalyst function may be exhibited, and it raises HC purifying rate after the time between [ of an internal combustion engine ] the colds, and warming up.

[0007]

[Means for Solving the Problem and its Function] When this invention person makes the layer of a rare-earths oxide intervene between the 1st catalyst bed which uses Pd as catalyst metal, and the 2nd catalyst bed which uses Pt or Rh as catalyst metal as a result of adding various experiments and examination to the above-mentioned technical problem Each of such catalyst metal and HC sorbent can exhibit effectively the function of the original which it has, and the desired end can be attained, When the 1st catalyst bed of the above, a rare-earths oxide layer, and the 2nd catalyst bed are especially formed in each surface of HC adsorbent particle, it finds out that a good result is obtained, and it comes to complete this invention. Invention concerning each claim is explained concretely hereafter.

[0008] <invention concerning Claim 1> -- [ this invention / HC sorbent which comes on a carrier from the powdered inorganic crystal nature molecular sieve which adsorbs hydrocarbon in exhaust gas is supported, and ] The 1st catalyst bed which uses Pd as catalyst metal is formed in each surface of the above-mentioned HC adsorbent particle. It is the catalyst for exhaust gas depuration of the internal combustion engine characterized by forming the rare-earths oxide layer which uses a rare-earths oxide as the main ingredients on the 1st catalyst bed of the above, and forming the 2nd catalyst bed which uses either [ at least ] Pt or the Rh(s) as catalyst metal on the above-mentioned rare-earths oxide layer.

[0009] In the invention concerned, at the time between [ of an internal combustion engine ] the colds, HC sorbent is adsorbed in HC in exhaust gas, and the discharge which is not purified HC is prevented. [ if exhaust gas temperature and the degree of catalyst temperature rise by warming up, desorption of HC by which each HC sorbent was adsorbed will start, but ] Since the 1st catalyst bed which uses Pd as catalyst metal is formed in the surface of each of this HC adsorbent particle, the desorption HC concerned contacts Pd easily and, for this reason, exhibits efficiently the catalyst function in which Pd carries out oxidative degradation of the HC concerned. Moreover, also in the 2nd catalyst bed, although the \*\*\*\*ing above-mentioned HC is decomposed by Pt or Rh, this Pt and Rh are a catalyst metal effective in depuration of NOx in exhaust gas, and exhibit the catalyst function as for which a returned part understands NOx by using as a reducing agent HC decomposed [ which decomposes and above-\*\*\*\*s ].

Moreover, oxidative degradation also of HC and CO which are newly discharged from an internal combustion engine is carried out with the catalyst metal of the 1st catalyst bed and the 2nd catalyst bed, and the reductive cleavage of NOx advances with such oxidation reaction.

[0010] On the other hand, the function of the barrier which prevents Pd from Above Pt, or Rh and Pd each other in the rare-earths oxide which intervenes between the 1st catalyst bed of the above and the 2nd catalyst bed is achieved, and the fall of the catalyst function by the interaction between such catalyst metal is prevented. [ on the other hand, if such barrier also bars diffusion of HC in exhaust gas, the 1st catalyst bed will be used effective in adsorption

and decomposition of HC but ] The barrier of the invention concerned is a rare-earths oxide, though this rare-earths oxide bars diffusion of HC a little, it is [ that extent ] low, and it does not become the trouble of adsorption of HC in the exhaust gas by HC sorbent of the 1st catalyst bed. This rare-earths oxide is O<sub>2</sub> on the contrary. Since it has the storage effect, it will contribute effective in oxidization of HC in the 1st catalyst bed and the 2nd catalyst bed.

[0011] A deer is carried out, in the invention concerned, since the 1st catalyst bed of the above, a rare-earths oxide layer, and the 2nd catalyst bed are formed in each surface of HC adsorbent particle, the oxidative degradation of HC and reduction decomposition of NO<sub>x</sub> are produced on each HC adsorbent particle, and each purifying rate becomes high.

[0012] As the above-mentioned carrier, it may be a MONORISU carrier here, or you may be the carrier of a pellet type. moreover, as an inorganic crystal nature molecular sieve as the above-mentioned HC sorbent the aluminosilicate (Y zeolite --) using aluminum as a metal which forms the frame (crystal lattice) of a crystal Various kinds of zeolites, such as mordenite, ZSM5, and a beta zeolite, It can replace with aluminum or various things, such as other metal content silicate of crystalline material porosity using other metal, such as Ga, Ce, Mn, and Tb, a thing which further almost consists only of silica, and a thing which does not contain Si, can be adopted with aluminum.

[0013] <invention concerning Claim 2> -- in the catalyst for exhaust gas depuration of the internal combustion engine with which this invention is indicated to above-mentioned Claim 1 -- the above-mentioned rare-earths oxide -- CeO<sub>2</sub> it is -- it is the catalyst for exhaust gas depuration of the internal combustion engine characterized by things.

[0014] In this invention, it is CeO<sub>2</sub> as a rare-earths oxide. Using is this CeO<sub>2</sub>. O<sub>2</sub> The storage effect is high and it is because it becomes advantageous to the oxidative degradation of HC.

[0015] <invention concerning Claim 3> -- in the catalyst for exhaust gas depuration of the internal combustion engine with which this invention is indicated to above-mentioned Claim 3, the above-mentioned carrier is a MONORISU carrier -- the above-mentioned CeO<sub>2</sub> per these 1l. of carriers It is the catalyst for exhaust gas depuration of the internal combustion engine characterized by quantity being 15-100g.

[0016] In the invention concerned, it is because it becomes advantageous to contact with exhaust gas and a catalyst bed to use a MONORISU carrier, and is because the small size and the weight saving of a catalyst can be attained and there is also little elevation of back pressure. Moreover, CeO<sub>2</sub> per 1l. of carriers It is for making quantity or more into 15 securing the effect which intercepts Pd of the 1st catalyst bed, Pt of the 2nd catalyst bed, or Rh. CeO<sub>2</sub> Quantity shall be 100g or less because it will become disadvantageous for diffusion of HC from the 2nd catalyst bed to the 1st catalyst bed if the quantity increases more than this.

[0017] <invention concerning Claim 4> -- this invention is the catalyst for exhaust gas depuration of the internal combustion engine characterized by the above-mentioned HC

sorbent being crystalline aluminosilicate in the catalyst for exhaust gas depuration of the internal combustion engine indicated to above-mentioned Claim 1.

[0018] In the invention concerned, as an HC sorbent, this has a heat-resisting property and the above-mentioned aluminosilicate is used because the HC adsorption capacity is high.

[0019]

[Effect of the Invention] The 1st catalyst bed which uses Pd as catalyst metal on each HC adsorbent particle according to invention concerning Claim 1, [ permitting diffusion of HC from the 2nd catalyst bed to the 1st catalyst bed, since the 2nd catalyst bed which uses Pt or Rh as catalyst metal, and a rare-earths oxide layer were formed and the rare-earths oxide layer was made to intervene between the 1st catalyst bed and the 2nd catalyst bed ] [ being able to avoid that Pt, or Rh and Pd interfere each other, fully being able to demonstrate the catalyst function of Pd, and preventing the discharge which is not purified at the time between the colds HC ] this -- since HC and NOx can be purified efficiently and decomposition depuration of HC and NOx is moreover performed on each HC adsorbent particle, high HC purifying rate and a high NOx purifying rate are acquired.

[0020] According to invention concerning Claim 2, it is CeO<sub>2</sub> as the above-mentioned rare-earths oxide. Since it used, it is this CeO<sub>2</sub>. O<sub>2</sub> [ high ] The storage effect can be used for the oxidative degradation of HC, and it becomes advantageous to improvement in HC purifying rate and a NOx purifying rate.

[0021] According to invention concerning Claim 3, it is the above-mentioned CeO<sub>2</sub>. Diffusing HC from the 2nd catalyst bed to the 1st catalyst bed, since quantity was considered as per [ 15-100g ] 1l. of MONORISU carriers, when avoiding contact with Pd of the 1st catalyst bed, Pt of the 2nd catalyst bed, or Rh, it becomes advantageous.

[0022] According to invention concerning Claim 4, since crystalline aluminosilicate was used as the above-mentioned HC sorbent, HC adsorption capacity of a catalyst increases and it becomes advantageous to improvement in HC purifying rate and a NOx purifying rate.

[0023]

[Working example] The work example of this invention is hereafter explained based on Drawings.

[0024] The wash coat of the proton type Y zeolite (cay van ratio 80) powder was carried out to the MONORISU carrier (400 cels /inch<sup>2</sup>) of the shape of a honeycomb made from cordierite as a preparation-HC sorbent of a <work-example 1>-catalyst. This wash coat sets the above-mentioned Y zeolite and hydrated alumina as a binder by the bulk density of 100:20, and produces a slurry by adding optimum dose of purified water and carrying out churning mixture. After making the above-mentioned carrier support Y zeolite of the specified quantity by repeating the process of immersing and pulling up the above-mentioned carrier to this slurry, blowing away an excessive slurry and drying, calcination of 500 degree-Cx 2 hours is

performed.

[0025] Next, the 1st catalyst bed was formed by making the above-mentioned wash coat layer support Pd by the sinking-in method. This sinking-in support infiltrates the palladium nitrate solution of prescribed concentration into the above-mentioned wash coat layer, and performs dryness and calcination (500 degree-Cx 2 hours).

[0026] Next, it is CeO<sub>2</sub> as a rare-earths oxide layer on the 1st catalyst bed of the above by dissolving a cerium nitrate in purified water, preparing cerium nitrate solution, infiltrating this cerium nitrate solution into the above-mentioned wash coat layer, and performing dryness and calcination. The layer was formed.

[0027] Next, the 2nd catalyst bed which uses Pt and Rh as catalyst metal was formed on [ two-layer ] Above CeO by mixing nitric acid platinum-P salt solution (dinitro diamine platinum (II) nitric acid aqueous acids) and nitric acid rhodium solution, and infiltrating this mixed solution into the above-mentioned wash coat layer.

[0028] Therefore, the catalyst structures of this example are the 1st catalyst bed 2 and CeO<sub>2</sub> to the surface of each HC adsorbent particle 1 on a carrier, as shown in drawing 1. A layer 3 and the 2nd catalyst bed 4 had carried out lamination formation from the bottom at order.

[0029] With the method of preparation of the evaluation-[NOx depuration performance] above-mentioned catalyst of a catalyst, the amount of HC sorbent support of the 1st catalyst bed per 1l. of carriers - 130g, It is the amount of Pd support 7g and CeO<sub>2</sub> The amount of support was 36g and some kinds of catalysts which shall be mutually different in the amount of support which doubled Pt and Rh of the 2nd catalyst bed were prepared. Each rate of a bulk density of Pt and Rh was set to 5:1. And after heat-treating for these catalysts, each catalyst was included in mimesis exhaust gas circulation equipment, and the NOx purifying rate (NOx C400) in case the inlet gas temperature of each catalyst is 400 degrees C was investigated. The measurement conditions are as follows.

[0030] Heat-treatment; 900 degree-Cx 50 hours (inside of the atmosphere)

Mimesis exhaust gas; ingredient It is N<sub>2</sub>, CO<sub>2</sub>, CO, C<sub>3</sub>H<sub>6</sub>, O<sub>2</sub>, H<sub>2</sub>, NO, however A/F=15.0, and H<sub>2</sub>O is added 10%.

space velocity; -- heating-rate [ of SV=60000h<sup>-1</sup> mimesis exhaust gas ]; -- a part (\*\*\*\* from room temperature to 500 degrees C) for 30-degree/

[0031] A/F value of mimesis exhaust gas were set to the lean side rather than theoretical air fuel ratio, in order that a performance difference might tend to have come out of the depuration of NOx by a catalyst to each catalyst as a difficult thing.

[0032] A result is combined with the thing of a comparative example 1, and is shown in drawing 2 . After a comparative example 1 performs the wash coat of HC sorbent to the same carrier as a work example, it performs sinking-in support in order of CeO<sub>2</sub> ->Pd->Pt and Rh, and differs in the order of sinking in, but it is the same as a work example. [ of the wash coat

method, the sinking-in method, and material] Moreover, as for the amount of HC sorbent support of a comparative example 1, 130g/L and the amount of Pd support are 7g/L and CeO<sub>2</sub>. The amount of support which doubled 36g/L, and Pt and Rh for the amount of support is 1.6g/L.

[0033] According to this figure, in the work example, it turns out that a high NO<sub>x</sub> purifying rate is acquired. This is CeO<sub>2</sub>. A layer is because [ of the 1st catalyst bed (Pd) and the 2nd catalyst bed (Pt, Rh) ] it did and interference with Pd, and Pt and Rh is barred. And when a work example is seen, it turns out that the NO<sub>x</sub> purifying rate is governed by the amount of support of Pt and Rh. Moreover, if the sum total of the amount of support of Pt and Rh shall be 0.8g/L or more, it turns out that a high NO<sub>x</sub> purifying rate is acquired. Moreover, since the improvement in a NO<sub>x</sub> purifying rate is seldom found even if the sum total of the amount of support of Pt and Rh exceeds 1g, it turns out that what is necessary is for this total quantity just to be 1.0g/L or more.

[0034] [HC light-off performance] With the method of preparation of the above-mentioned catalyst, the amount of HC sorbent support of the 1st catalyst bed per 1L of carriers 130g, The amount of support which doubled Pt and Rh of 7g and the 2nd catalyst bed for the amount of Pd support shall be 1.6g/L, and it is CeO<sub>2</sub>. Some kinds of catalysts which shall be mutually different in the amount of support were prepared. And after giving the heat-treatment same for these catalysts as the case of the point, each catalyst was included in mimesis exhaust gas circulation equipment, and exhaust gas temperature (HC T50) in case it becomes 50%, the light-off temperature, i.e., HC purifying rate, of HC, was investigated. Measurement conditions are the same as the case of evaluation of the above-mentioned NO<sub>x</sub> depuration performance except for the air-fuel ratio of mimesis exhaust gas. It was made to change by the width of 0.9 [ \*\*] focusing on A/F=14.7 about the air-fuel ratio of mimesis exhaust gas. The frequency of this change was 1Hz.

[0035] A result is combined with the thing of the above-mentioned comparative example 1, and is shown in drawing 3. According to this figure, a work example is understood that light-off temperature is low and HC purifying performance is higher than a comparative example 1. And it is CeO<sub>2</sub> when a work example is seen. The light-off temperature of HC in case the amount of support is 15g/L is the lowest, and also when this amount of support becomes less than this and it increases, light-off temperature is high. CeO<sub>2</sub> [ that HC light-off temperature is high when there are few amounts of support ] Pd of the 1st catalyst bed, and Pt and Rh of the 2nd catalyst bed interfere mutually, and it thinks because those catalyst functions are no longer exhibited fully. CeO<sub>2</sub> As for HC light-off temperature being high when the amount of support increases, the spreading diffusion of HC to the 1st catalyst bed is CeO<sub>2</sub>. It thinks because it is barred. Moreover, this figure to CeO<sub>2</sub> If the amount of support shall be 15-100g/L, it turns out that high HC purifying rate is acquired.

[0036] [The amount of Pd support, HC light-off performance], etc. Proton type Y zeolite (cay van ratio 80) powder is supported by the honeycomb-like MONORISU carrier made from cordierite so that the amount of support may become 130g/L by the wash coat method. Two or more sorts of catalysts which this coat layer comes to support with the various amounts of support by the sinking-in method in Pd were prepared. And change of HC light-off temperature over change of the amount of Pd support was investigated using these catalysts. The describing [ above ] wash coat method and the sinking-in method are the same as the procedure when preparing a previous catalyst, and the measurement conditions and procedure of HC light-off performance of them are also the same as that of the point.

[0037] The result is shown in drawing 4. According to this figure, if the amount of Pd support is increased, HC light-off temperature will fall, but if it becomes more than a certain quantity, the fall of HC light-off temperature will not progress so much. The relation between such an amount of Pd support and HC light-off performance is also the same as when a rare-earths oxide layer and the 2nd catalyst bed are prepared, therefore the said thing with appropriate the amount of Pd support being 6g/L or more is made for improvement in HC light-off performance.

[0038] The slurry was produced by setting 500g of super-stabilization Y type zeolite (cay van ratio 30) powder, 150g of hydrated alumina powder (binder), and Water 1.5L as a preparation-HC sorbent of the catalyst of the <work-example 2>-work example 2, and carrying out churning mixture. This carrier was made to support HC sorbent of the specified quantity by performing a wash coat to the same carrier as a work example 1 using this slurry.

[0039] Next, the 1st catalyst bed was formed in the surface of each HC adsorbent particle by preparing Pd concentration 4.4wt% of palladium nitrate solution [ 200g of ], and performing calcination (500 degree-Cx 2 hours), after infiltrating altogether HC sorbent coat layer of the above-mentioned carrier and drying this.

[0040] Next, it is CeO<sub>2</sub> on the 1st catalyst bed of each HC adsorbent particle by preparing Ce concentration 6.0wt% of cerium nitrate solution [ 640g of ] by dissolving a cerium nitrate in purified water, and performing same calcination, after infiltrating this into the above-mentioned HC adsorbent layer altogether and drying it. The layer was formed.

[0041] Next, by mixing nitric acid platinum-P salt solution and nitric acid rhodium solution It is CeO<sub>2</sub> of each HC adsorbent particle by preparing Rh concentration 0.17wt% of mixed solution [ 200g of ], and performing same calcination Pt concentration 0.87wt%, after infiltrating this into the above-mentioned HC adsorbent layer altogether and drying it. The 2nd catalyst bed which uses Pt and Rh as catalyst metal was formed on the layer.

[0042] 150g/L and the amount of Pd support of the above-mentioned carrier are [ the acquired catalyst / the amount of support of 1.3L and HC sorbent ] 7g/L and CeO<sub>2</sub>. The amount of support with which the amount of support doubled 36g/L, and Pt and Rh was 1.6g/L (however,

Pt:Rh=5:1).

[0043] - HC sorbent coat layer was formed in the carrier, and this was made to support Pd by the sinking-in method like the preparation-work example 2 of the catalyst of a comparative example 2. And Pt concentration 3.7wt% which mixes nitric acid platinum-P salt solution and nitric acid rhodium solution, It is CeO<sub>2</sub> to Rh concentration 0.74wt% of mixed solution [ 100g of ]. It calcinated by evaporating moisture by performing mixed churning, having thrown in 100g of powder and heating on a hot plate (500 degree-Cx 2 hours). CeO<sub>2</sub> with which this Pt and Rh were supported The slurry was obtained by carrying out churning mixture of 100g of powder, and 15g of hydrated alumina and purified water 300mL. The wash coat was performed on HC sorbent coat layer of the above-mentioned carrier using this slurry.

[0044] Therefore, the catalyst of the acquired comparative example 2 is CeO<sub>2</sub> with which HC adsorbent layer with which the layer of two upper and lower sides is formed on the carrier, and the substratum supported Pd, and the upper layer supported Pt and Rh. It is a layer. Moreover, as for a carrier, as for 1.3L and the amount of HC sorbent support, 150g/L and the amount of Pd support are CeO<sub>2</sub> which supported 7g/L, and Pt and Rh. The amount of support is 38g/L (however, Pt:Rh=5:1).

[0045] - Like the preparation-work example 2 of the catalyst of a comparative example 3, form HC sorbent coat layer in a carrier, use cerium nitrate solution for this coat layer, and it is CeO<sub>2</sub> by the same sinking-in method. An equivalent amount was made to support and an equivalent amount of Pd(s) were made to support by the same sinking-in method further using palladium nitrate solution. Therefore, the point that the catalyst of the acquired comparative example 3 does not have Pt and Rh will be different from the catalyst of a work example 2.

[0046] - Form HC sorbent coat layer in a carrier like the preparation-work example 2 of the catalyst of a comparative example 4. Cerium nitrate solution is used for this coat layer, and it is CeO<sub>2</sub> by the same sinking-in method. An equivalent amount was made to support and an equivalent amount of Pt(s) and Rh(s) were made to support by the same sinking-in method further using the mixed solution of nitric acid platinum-P salt solution and nitric acid rhodium solution. Therefore, the point that the catalyst of the acquired comparative example 4 does not have Pd will be different from the catalyst of a work example 2.

[0047] - About evaluation-above-mentioned each catalyst of the catalyst, it included in the exhaust air system of the car which carries a 3000 cc V type 6-cylinder engine, respectively, and exhaust gas cleaning capacity was evaluated by running mode LA-4. A result is as being shown in Table 1.

[0048]

[Table 1]

	Y1モード		LA-4トータル	
	HC净化率	NOx净化率	HC净化率	NOx净化率
実施例2	88. 5%	82. 1%	94. 2%	80. 1%
比較例2	87. 2%	84. 0%	93. 6%	81. 8%
比較例3	89. 6%	79. 5%	94. 4%	71. 4%
比較例4	84. 2%	85. 6%	92. 8%	83. 4%

[0049] According to this table, in both the work examples 2, HC purifying rate and a NOx purifying rate are high. [ the thing with the work example 2 higher / HC purifying rate / and the comparative example 2 higher / a NOx purifying rate / when a work example 2 is compared with a comparative example 2 ] At a work example 2, it is CeO<sub>2</sub> on the 1st catalyst bed (Pd) of each HC adsorbent particle. CeO<sub>2</sub> [ thickness / to the layer being formed / in a comparative example 2 ] It is because it is formed so that a layer may cover the whole HC adsorbent layer. According to the comparative example 3, since there are not Pt and Rh, the NOx purifying rate is low, and by the comparative example 4, since there is no Pd, HC purifying rate is low.

[0050] The catalyst of a <work-example 3>-work example and the preparation-work example 2 of each catalyst of a comparative example, and the work example 3 of the structure same to the same procedure as \*\*\*\*\* was prepared. A cay van ratio uses the H type super-stabilization Y type zeolite of 80 as an HC sorbent, and the catalyst of this work example 3 is CeO<sub>2</sub>. The point that the amount of support is 35g/L is different from the catalyst of a work example 2. Moreover, each catalyst of the following comparative examples 5-9 was prepared.

[0051] Comparative examples 5 are the kind of HC sorbent, and CeO<sub>2</sub>, although it is the catalyst of the same structure as the previous comparative example 2. Other conditions, such as the amount of support, were made the same as a work example 3.

[0052] The catalyst of a comparative example 6 is CeO<sub>2</sub> which supported HC adsorbent layer and Pd on the carrier. A layer and CeO<sub>2</sub> which supported Pt and Rh A layer is formed sequentially from the bottom and it is the kind of HC sorbent, and CeO<sub>2</sub>. Other conditions, such as the amount of support, were made the same as a work example 3.

[0053] The catalyst of a comparative example 7 forms HC adsorbent layer on a carrier, and this HC adsorbent layer is made to support Pt and Rh by the sinking-in method. CeO<sub>2</sub> which supported Pd on it A layer is formed and it is this CeO<sub>2</sub>. A layer is made to support Pt and Rh by the sinking-in method, and it is the kind of HC sorbent, and CeO<sub>2</sub>. Other conditions, such as the amount of support, were made the same as a work example 3.

[0054] Form HC adsorbent layer on a carrier, this is made to carry out sinking-in support of these in the order of CeO<sub>2</sub> ->Pd->Pt and Rh, and the catalysts of a comparative example 8 are the kind of HC sorbent, and CeO<sub>2</sub>. Other conditions, such as the amount of support, were made the same as a work example 3.

[0055] The catalyst of a comparative example 9 is CeO<sub>2</sub> which formed HC adsorbent layer on the carrier and supported Pd, Pt, and Rh. A layer is formed with a wash coat on the above-mentioned HC adsorbent layer, and it is the kind of HC sorbent, and CeO<sub>2</sub>. Other conditions, such as the amount of support, were made the same as a work example 3.

[0056] - After heat-treating for evaluation-above-mentioned each catalyst of a catalyst, each catalyst was included in mimesis exhaust gas circulation equipment, and a NO<sub>x</sub> purifying rate (NO<sub>x</sub> C400) in case the inlet gas temperature of each catalyst is 400 degrees C, and the light-off temperature (HC T50) of HC were investigated. The conditions of heat-treatment in this case, the conditions of measurement, and a procedure are the same as it of a work example 1, and the result is shown in Table 2.

[0057]

[Table 2]

	実施例	比較例					
		3	5	6	7	8	9
NO <sub>x</sub> C400(%)		18	19	21	17	7	5
HC T50 (℃)		268	277	296	298	292	265

[0058] According to this table, both the work examples 3 have the depuration performance of HC, and the high depuration performance of NO<sub>x</sub>. Comparative examples 5 and 6 are thickness CeO<sub>2</sub> here. Since the layer has covered the whole HC adsorbent layer, it is HC. T50 becomes high. Since it is separated from comparative examples 7 and 8 of Pd and HC sorbent, it is HC. Since T50 becomes high and, as for comparative examples 8 and 9, Pd, Pt, and Rh are approaching, it is NO<sub>x</sub>. C400 is accepted to be low.

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[Brief Description of the Drawings]

[Drawing 1] The sectional view showing the catalyst structure of a work example 1

[Drawing 2] The graphical representation showing the relation between a NO<sub>x</sub> purifying rate in case catalyst inlet gas temperature is 400 degrees C, and the amount of Pt-Rh support

[Drawing 3] CeO<sub>2</sub> Graphical representation showing the relation between the amount of support, and the light-off temperature in HC depuration

[Drawing 4] The graphical representation showing the relation between the amount of Pd sinking-in support, and the light-off temperature in HC depuration

[Explanations of letters or numerals]

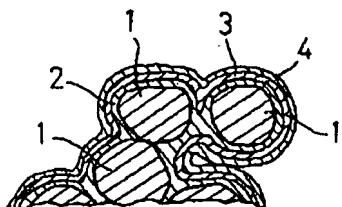
1 HC Adsorbent Particle

2 1st Catalyst Bed

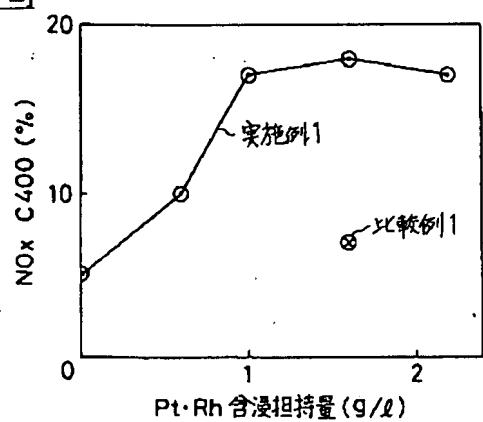
3 CeO<sub>2</sub> Layer (Rare-Earths Oxide Layer)

4 2nd Catalyst Bed

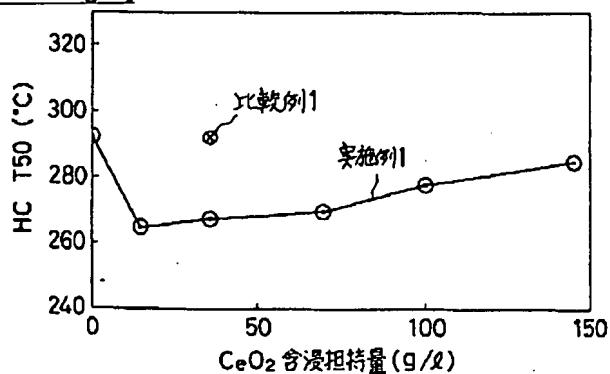
[Drawing 1]



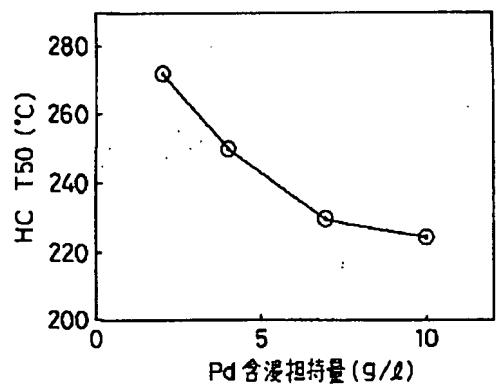
[Drawing 2]



[Drawing 3]



[Drawing 4]



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[Translation done.]

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